Quick User Manual

SG30KTL-M
PV Grid-Connected Inverter

SG30KTL-MV2-QUEN-Ver21-201411 Version: 2.1

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Notice

The contents of the manual will be periodically updated or revised due to the product development. Specifications are subject to changes without advance notice!

The latest manual can be acquired via www.sungrowpower.com.

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About this manual

This quick user manual provides a general instruction required for installing, wiring, commissioning and operating the SG30KTL-M inverter.

In no case shall this quick user manual substitute for the user manual or related notes on the device.

For further instructions on installing or operating, please refer to the detailed user manual which you can require on the package CD or via www.sungrowpower.com.

This quick user manual shall be used in accompany with the attached CD.

SG30KTL-M will be referred to as inverter hereinafter unless otherwise specified.

To prevent personal injury or material damage, the inverter must only be installed, operated, maintained and serviced by **qualified personnel**:

- They must be trained specially;
- They have already read over and understood the manual and other related documents;
- They have been familiar with safety requirements for electrical system and local safety-related guidelines.

This manual must be always accompany the equipment and considered as an integral part of the equipment. It should be available at all times to everyone who works on the equipment, even when the equipment is transferred to another user.

All images used in the manual are for reference only. The actual product you receive may differ.

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1 Important Safety Instructions

1.1 Symbols Explanation

Important instructions contained in this manual should be followed during installation, operation and maintenance of the inverter. And they will be highlighted by the following symbols.

DANGER

DANGER indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.

WARNING

WARNING indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.

CAUTION

CAUTION indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.

NOTICE

NOTICE indicates a situation which, if not avoided, could result in equipment or property damage.

NOTE indicates additional information, emphasized contents or tips to help you solve problems or save time.

1.2 Symbols on the Inverter Body

This symbol indicates that you should wait at least 10 minutes after disconnecting the inverter from the utility grid and from the PV input before touching any inner live parts.

Hot surface! In order to reduce the risk of burns, do not touch the hot surface when the device is running.

Look over the user manual before any operation on the inverter!

The installation and service of the inverter unit can only be performed by qualified personnel.

Do not disconnect DC connectors from the unit under load!

1.3 Important Safety Instructions

The inverter has been designed and tested strictly according to the international safety regulations. As electrical and electronic equipment, safety instructions related to them must be complied with during installation, operation and maintenance.

The following safety instructions must be read and keep in mind prior to any work.

Before Installation

⚠ CAUTION

There is a risk of injury due to improperly handling the device!

- **Always follow the instructions contained in the manual when moving and positioning the inverter.**
- **The weight of the equipment can cause injuries, serious wounds, or bruise if improperly handled.**

During Installation

Prior to installing the inverter onto the wall, it is crucial to make certain that the inverter is not electrically connected.

⚠ DANGER

Prior to installing the inverter onto the wall, it is crucial to make certain that the inverter is not electrically connected.

⚠ CAUTION

System performance loss due to bad ventilation!

The equipment requires good quality ventilation during operation. It is essential to keep the unit upright and nothing covering the heat sink in order to ensure that the equipment interior is well cooled down.

During Electrical Connection

⚠ DANGER

PV arrays will produce electrical energy when exposed to sunlight and thus can create an electrical shock hazard.

- **Wiring of the PV arrays should only be performed by qualified personnel.**

NOTICE

All electrical connections must be in accordance with local and national standards.

Only with the permission of the local energy sector, the inverter can be connected into the utility grid.

⚠ WARNING

All cables must be firmly attached, undamaged, properly insulated and adequately dimensioned.

During Inverter Operation

Do not open the enclosure when the inverter is under voltage. There is an unlikely but possible risk of explosion in very specific cases of malfunction. The housing will protect persons and property from such an explosion, only if it is correctly sealed.

DANGER

There is a risk of inverter damage or personal injury!

Do not disconnect DC connectors while the inverter is under AC load! First de-energize the equipment from dual power sources and then verify that there is no voltage present.

CAUTION

There is a risk of burn!

Prevent from touching device hot parts (such as heat sink) during operation. Only LCD display panel and DC switch can be touched during inverter operation.

Maintenance and Service

DANGER

Before any service work, you should obey the following procedures.

- **Disconnect inverter from the utility grid side first and then PV arrays;**
- **Wait at least 10 minutes until the inner capacitors discharge completely;**
- **Verify that no voltage or current present with appropriate testing device.**

CAUTION

Keep unrelated person away!

A temporary warning sign and barrier must be posted to keep non-related person away for any period while performing electrical connection and service work.

NOTICE

- **Any malfunction that may impair the inverter safety functions must be repaired immediately before the inverter is restarted.**
- **Inverter contains no owner serviceable parts inside. Please contact local authorized personnel if any service work is required.**

Servicing of the device in accordance with the manual should never be undertaken in the absence of proper tools, test equipment or more recent revision of the manual which is clearly and thoroughly understood.

NOTICE

There is a risk of inverter damage if it is improperly serviced.

Use only accessories and spare parts approved by the inverter manufacturer. Never modify the inverter or other components of the inverter. Otherwise it will cause loss of any or all warranty rights.

NOTICE

There is a risk of inverter damage due to electrostatic discharge!

The printed circuit boards contain components sensitive to electrostatic discharge. Wear a grounding wrist band when handling the boards. Avoid unnecessary touch with the boards during replacement.

Others

NOTICE

The selected country settings can be changed by qualified personnel only!

Unauthorized modification to country settings should be prohibited. Alternation of the country settings may cause a breach of the type-certificate marking.

WARNING

All safety instructions, warning labels and nameplate on the inverter body:

- **Must be clearly visible;**
- **Must not be removed, covered and pasted.**

2 Product Introduction

2.1 Intended Usage

SG30KTL-M, 3-phase without transformer string inverter, is a crucial unit between the PV strings and utility grid in the PV power system.

⚠ WARNING

The inverter CANNOT be connected to the PV modules, the positive or negative terminal of which needs to be grounded.

The intended usage of the inverter is illustrated in Fig. 2-1.

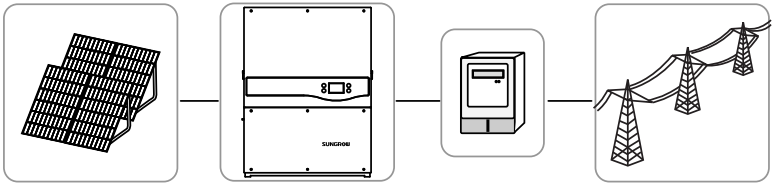


Fig. 2-1 Application of the inverter of the PV Power System

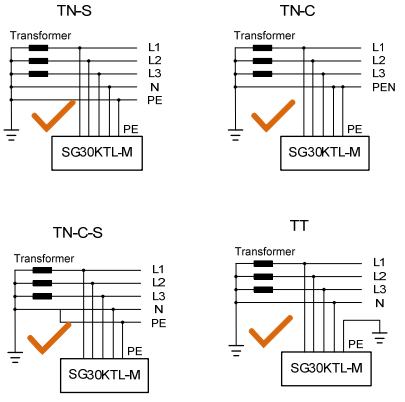
Item	Description	Note
A	PV strings	Monocrystalline silicon; polycrystalline silicon and thin-film without grounding of protection class II
B	Inverter	SG30KTL-M
C	Metering device	meter cupboard with power distribution system
D	Utility grid	TT, TN-C, TN-S, TN-C-S

NOTICE

Any other or additional usage is not permitted except the intended usage.

Inverter may only accept PV modules with Protection Class II as its input.

Inverter may only be connected to utility grid via distribution board. Local loads (home appliance, lights, motor loads, etc.) cannot be connected between inverter and AC circuit breaker on the distribution board.

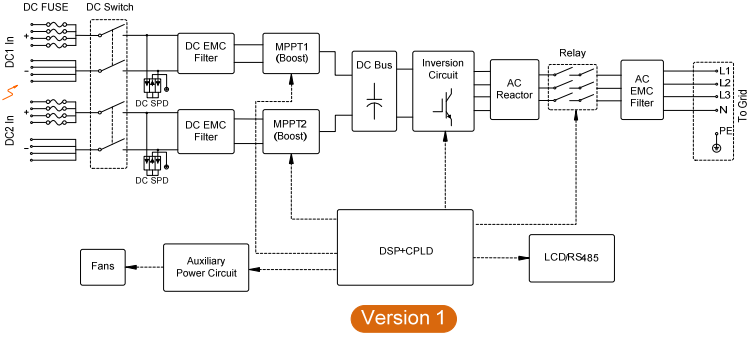


2.2 Principle Description

PV strings input voltage is transmitted to DC BUS via Boost circuit. The inverter is equipped with MPPTs for two DC inputs to ensure that the maximum power can be utilized even in different PV modules installation conditions.

Inversion circuit converts DC power into AC power, which will be fed into the utility grid via five core terminals. Protective circuits are designed to guarantee inverter safe operation and human safety.

We provide 2 options of inverters for the users, the principle design is illustrated Fig. 2-2:



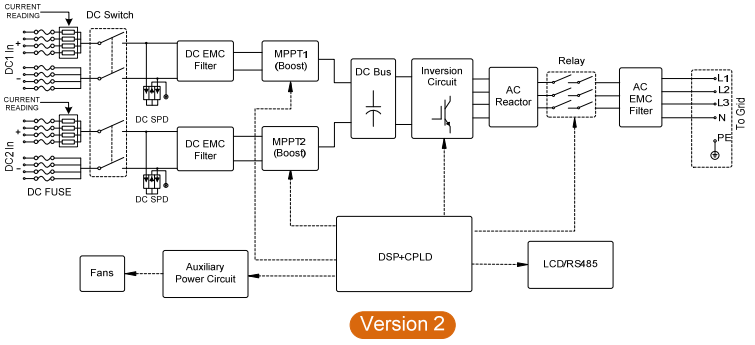


Fig. 2-2 Main Circuit Diagram of Inverter

The Version 2 inverter is equipped with Fuses for both positive and negative DC inputs, and can detects positive fuse current.

2.3 Unpacking and Detecting

Unpack the carton and take out all the accessories. Inspect the inverter for visible damages and check the completeness of the delivery contents according to the inner packing list.

Contact your supplier if any of the contents is missing. SG30KTL-M is unavailable if any damage is detected.

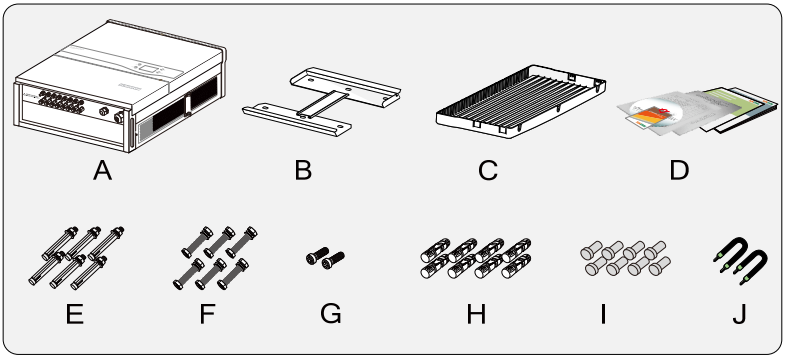


Fig. 2-3 Delivery Contents

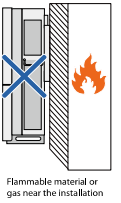
Item	Name	Description
A	Inverter unit	---
B	Backplate	It is used for mounting inverter onto the wall.
C	Inverter cap	It is for inverter's better weather-proof function.
D	Documents	Documents include quality certificate, packing list, product test report , CD and quick user manual.
E	Expansion bolts	Six units. It is used for fastening backplate onto concrete wall.
F	Fastener set	Six units. It is used for fastening backplate onto metal frame.
G	Fix screws	2 M4×16 screws for fix the inverter to the backplate.
H	DC connectors	Ten pairs. PV input cables must be equipped with the connector.
I	Waterproof plugs	Four pairs. Seal the unused DC terminals with waterproof plugs.
J	Jumper cables	Configure PV configuration in parallel mode via jumper cables.

3 Mounting the Inverter

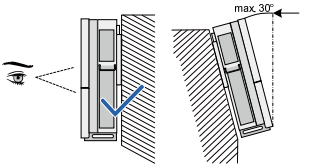
3.1 Select an optimal installation position

- The inverter must be mounted on a firm wall or metal frame.

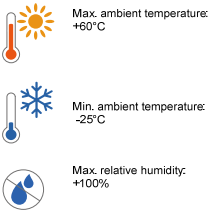
- Mount the inverter at an appropriate site without flammable material and flammable gas nearby.



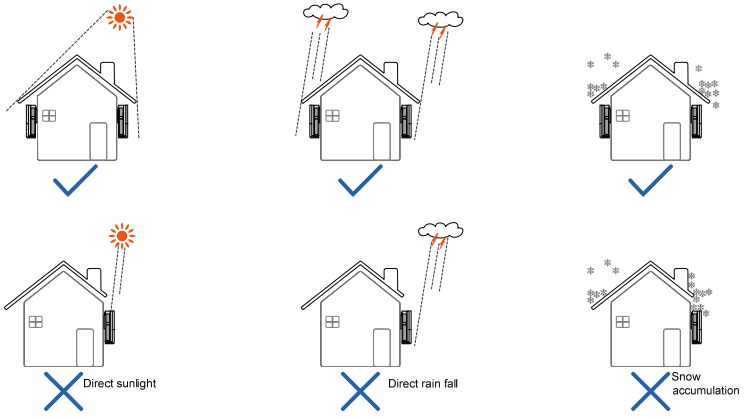
- Install the inverter vertically at eye level or tilted backwards by max. 30°.



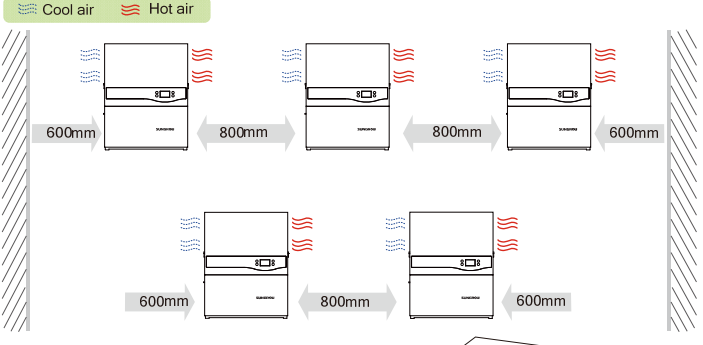
- The inverter unit with IP65 can be installed indoors or outdoors where the ambient temperature and relative humidity meet the requirement.



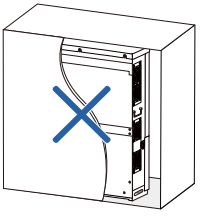
- Avoid exposing the inverter to the sunlight or rain or snow directly!



- Take enough space for convection into consideration during installing multiple inverters. It is suggested that position the multiple inverters in a staggered way if necessary.



- Do not install the inverter in a closed cabinet.



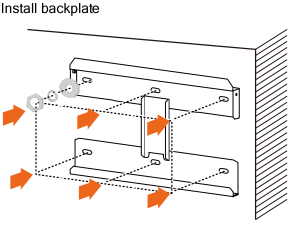
3.2 Installation

Step 1 Move the inverter to the installation site with the help of another person or the lifting device by means of the handles.

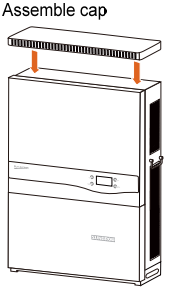
NOTICE

Always remember the weight of the inverters! Grasp the equipment by both hands by means of handles.

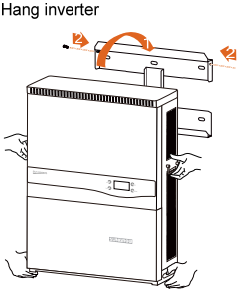
Step 2 Fix the backplate on the wall with appropriate fixing sets.



Step 3 Assemble the top cap of the inverter.



Step 4 Mount the inverter onto the backplate and secure it with M4 screws.



4 Electrical Connection

DANGER

Death hazards due to high voltage existing inside the inverter!

Make sure that all the DC and AC cables to the inverter are not live before you start the electrical work.

Do not turn on the AC side or DC side circuit breaker until all inverter electrical connections have completed.

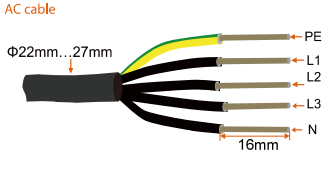
DANGER

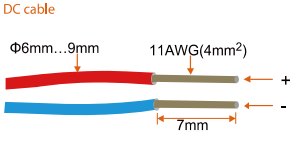
Do not open the enclosure when the inverter is under voltage.

There is a risk of inverter damage or personal injury!

4.1 Cable Requirements

Cable	Conductor size		Recommended conductor size	
AC Cable	8AWG...5AWG	8...16mm²	---	
DC Cables	12AWG...10AWG	4...6mm²	11AWG	4mm²
RS485 Comm. Cables	Twist-pair type cable or Twist-pair type shielding Ethernet cable		-	
Second PE Cable	10AWG...8AWG	6mm²	9AWG	6mm²





4.2 AC Connection

AC Side Circuit Breaker

An independent three or four-pole circuit breaker (minimum size value 63A) for each inverter must be installed at the output side to ensure that the inverter can be securely disconnected.

NOTICE

There are some points that are not allowed for the inverter:

- **It is not allowed for several inverters to use the same circuit breaker.**
- **It is not allowed to connect loads between inverter and circuit breaker.**

Connecting Inverter to AC Grid

DANGER

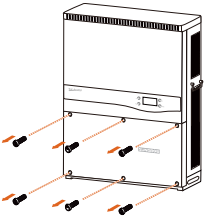
Danger to human life due to high voltage existing inside the inverter!

Make sure that all the DC and AC cables to the inverter are not live before you start the electrical work.

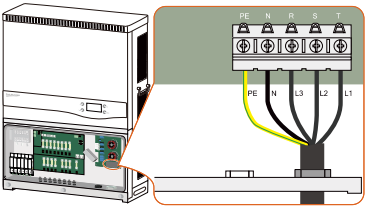
Do not turn on the AC side circuit breaker until all inverter electrical connections have completed.

Step 1 Disconnect AC circuit breaker and prevent it from reconnection inadvertently.

Step 2 Loose the six screws on the lower connection cabinet.



Step 3 Pull the cables and connect L1/L2/L3/N/PE cables ends to the corresponding terminal blocks.

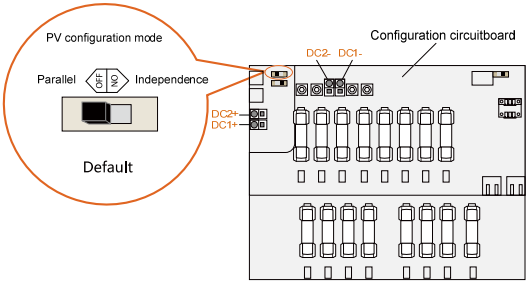


4.3 DC Connection

4.3.1 PV mode configuration

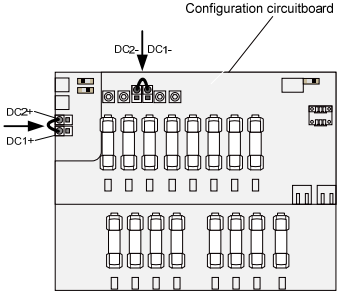
The two PV inputs can be configured in independent mode or parallel mode. Refer to the user manual for an appropriate mode selection.

PV configuration mode can be performed by a switch on the configuration circuit board.



- For independence mode: turn the switch ON.
- For parallel mode: turn the switch OFF.

When selecting parallel PV configuration mode, you should connect DC1+ to DC2+ and DC1- to DC2- on the DC connection circuit board by inserting jumper cables of cross-section not less than 6mm^2 (10 AWG) as the following diagram shown.



4.3.2 DC Cable Connection Procedures

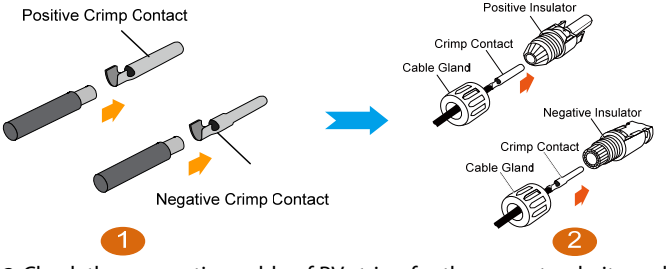
DANGER

Make sure that all the DC and AC cables to the inverter are not live before you start the electrical work.

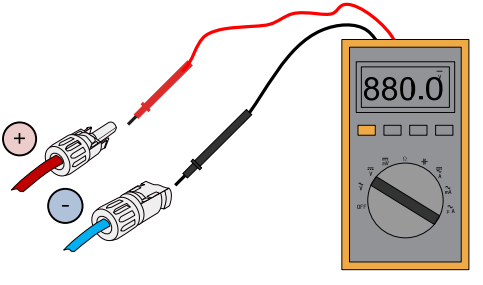
WARNING

Neither the DC positive pole nor the DC negative pole of the PV string is permitted to be grounded.

Step 1 Assemble the DC plug-in connectors and disconnect the DC switch.



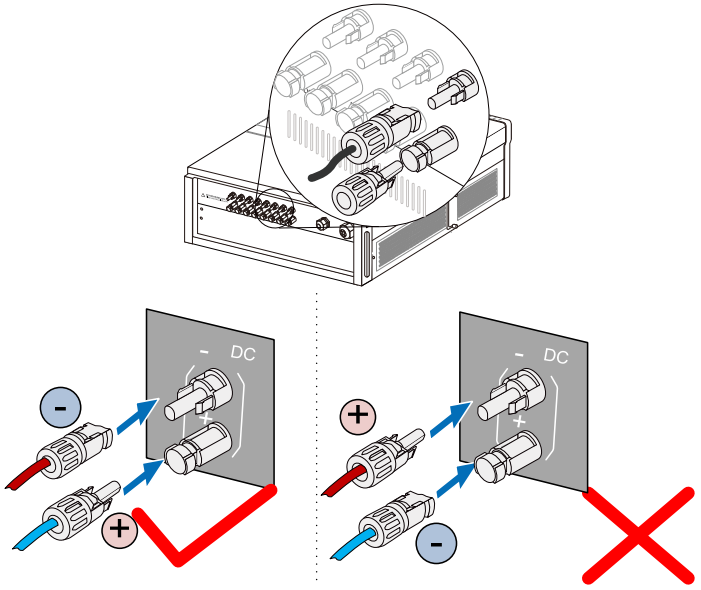
Step 2 Check the connection cable of PV string for the correct polarity and that the open-circuit voltage does not exceed the inverter input limit 1000V, even under the lowest operating temperature.



NOTICE

- **Check the positive and negative polarity of the PV cells. After confirmation, you can insert the DC connectors into the input terminals on the bottom of the inverter.**
- **For the same MPPT, reverse connection of a single string is prohibited. A permanent failure of the system or inverter may follow if otherwise.**

Step 3 Plug the positive and negative DC connectors into PV terminals underneath the connection cabinet until there is an audible sound.



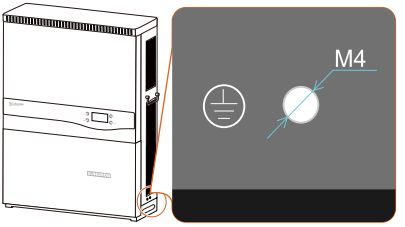
Step 4 Seal the unused DC terminals with the terminal caps.

4.4 Second Protective Earth Terminal

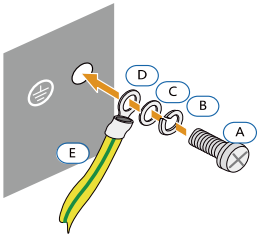
The inverter is equipped with second protective earth terminal as specified in EN 50178.

4.4.1 Second PE Terminals

There is a second PE terminal on one side of the inverter. You may choose to connect PE connection.



4.4.2 Second PE Connection



Item	Description	Remark
A	Screw	M4×12mm
B	Lock washer	-
C	Washer	-
D	Cable socket	-
E	Yellow-green cable	6mm^2(9AWG)

*The connection parts are not included in the delivery scope.

4.5 Communication Connection

There is a communication cable gland(RS485) at the bottom of the inverter. Configuration circuit board has two optional connection terminals: RS485 A/B terminal blocks and RJ45 plug-in terminals, and a 120 Ω terminating resistor switch.

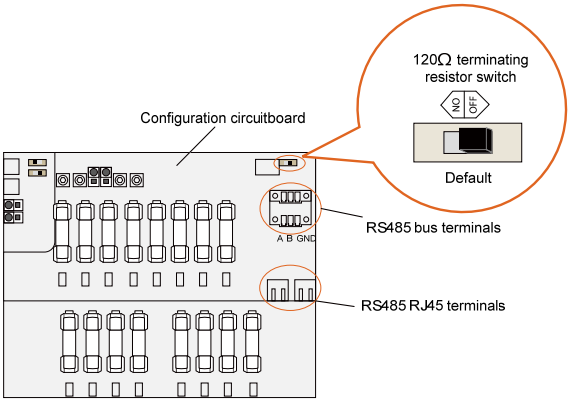
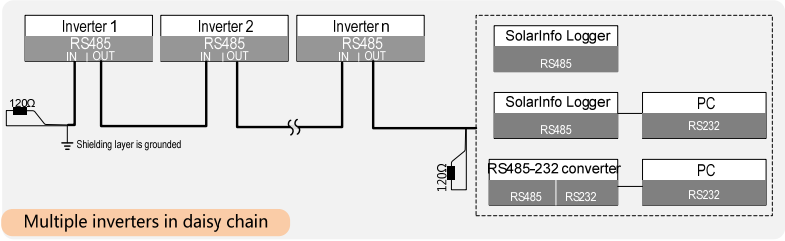


Fig. 4-1 Communication Configuration

4.5.1 Communication System

Where there is more than one inverter, all inverters can be connected to data logging device in daisy chain. The first and last inverters in the chain must be terminated with a resistor of 120Ω. The shielding layer of RS485 cable should be single-point grounded.



4.5.2 RS485 Communication Connection

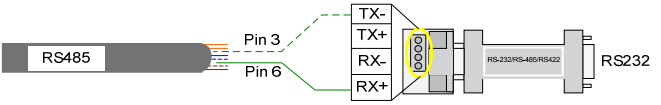
RS485A/B Bus Connection

Step 1 Lead RS485 shielded twisted pair cables through communication cable gland to the configuration circuit board.

Step 2 Trip off the insulating layer of the communication cables.

Step 3 Connect all RS485 cables to the RS485 bus terminal blocks according to the position of the inverter.

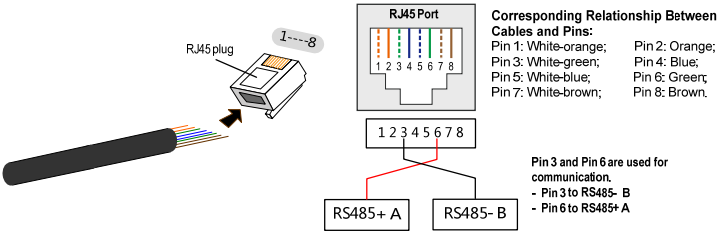
SolarInfo logger and RS485-232 converter are optional parts and can be ordered from Sungrow.



RJ45 Connection

Step 1 Lead Network cable through communication cable gland to the configuration circuit board.

Step 2 Use the Ethernet crimper to crimp the cables and connect cables to RJ45 plug according to TIA/EIA 568B.


RJ45 plug
1----8
RJ45 Port
1 2 3 4 5 6 7 8
Corresponding Relationship Between Cables and Pins:
Pin 1: White-orange;
Pin 2: Orange;
Pin 3: White-green;
Pin 4: Blue;
Pin 5: White-blue;
Pin 6: Green;
Pin 7: White-brown;
Pin 8: Brown.
1 2 3 4 5 6 7 8
RS485+ A
RS485- B
Pin 3 and Pin 6 are used for communication.
- Pin 3 to RS485- B
- Pin 6 to RS485+ A

Step 3 Connect the RJ45 plug into the RS485 in/RS485 out terminal on the configuration circuit board according to the position of the inverter.

5 Commissioning

Before starting the inverter, make sure all installation and connections are co mpleted and verified.

5.1 Description of Button Function

Inverter offers two buttons for the user to look up the running information and configure parameters settings. The two buttons have multiple functions. Please refer to Tab. 5-1 before any operation onto inverter.

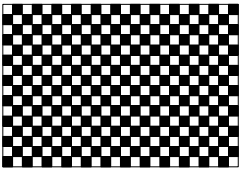
Tab. 5-1 Button Function

Button	Operation	Description
ESC	Press less than two seconds	Move upwards or downwards, or increase setting value. Hereafter, it is referred to as "Press ∨".
	Press more than two seconds	Return to the previous menu or cancel the command. Hereafter, it is referred to as "Press **ESC**".
ENTER	Press less than two seconds	Move left or right, or turn pages. Hereafter, it is referred to as "Press >".
	Press more than two seconds	Enter into the sub-screen or confirm the command. Hereafter, it is referred to as "Press **ENTER**".

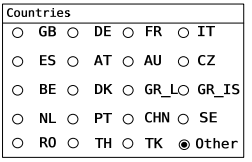
5.2 Commissioning Procedure

Step 1 Close external AC circuit breaker.

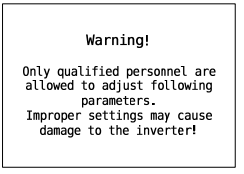
Step 2 Rotate DC switch to "ON" position.
Suppose there are sufficient sunlight and enough DC power. PV arrays initialize and supply DC power to inverter. The LCD display is activated to check the validity first. If there is a defect on the display, contact Sungrow.



Step 3 **Press** ▼ to choose country code. Confirm the settings by **Pressing** **ENTER**.



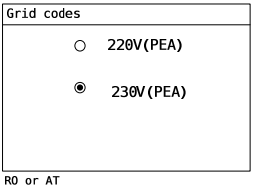
Step 4 Select the country code according to the inverter's installation country. Each country code represents corresponding local protective parameters that have been preset before delivery. Before country setting, there is warning screen.


Warning!
Only qualified personnel are allowed to adjust following parameters.
Improper settings may cause damage to the inverter!

If the inverter is installed where the country code is not included, please choose item "Other" and manually set the protective parameters.

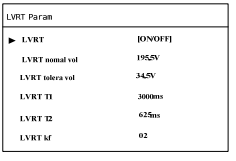
Step 5 If the country code set as TH, a Grid codes page special for Thailand will appear. **Press** ▼ to select grid code. Confirm the selection by **Pressing** **ENTER**.

TH



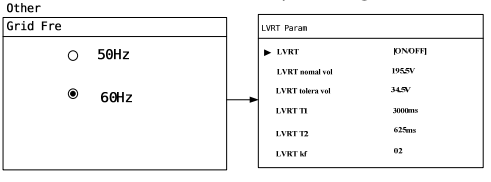
If the country code set as RO or AT, a LVRT Param page as shown in the right will appear. Press ▼ to select. Confirm the selection by Pressing **ENTER**.

RO or AT

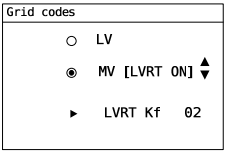


If the country code set as Other, a Grid Fre and LVRT Param page as shown below will appear. Press ▼ to select. Confirm the selection by Pressing **ENTER**.

Other



If country selected is not the three mentioned above, a Grid codes page as shown in the right will appear. Press ▼ to select. Confirm the selection by Pressing **ENTER**. When choose MV, Press **ENTER** to enter the LVRT function selection, Press ▼ to switch on or off the LVRT function and Press **ENTER** to confirm the selection.

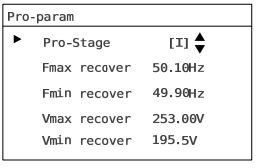


The Kf configure item will appear only when switching on the LVRT function.

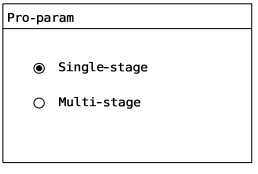
If the Country selected does not have the "Grid codes" directives, this configuration will not affect the following procedures.

However, you may select the MV to enable/disable the LVRT function regardless of the country selected.

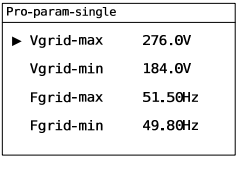
Step 6 After completing the operation confirmed that the interface above, if the country code set as IT, AT or Other. The Pro-Stage interface will appear. Press ▼ to select. Press **ENTER** to confirm the selection.



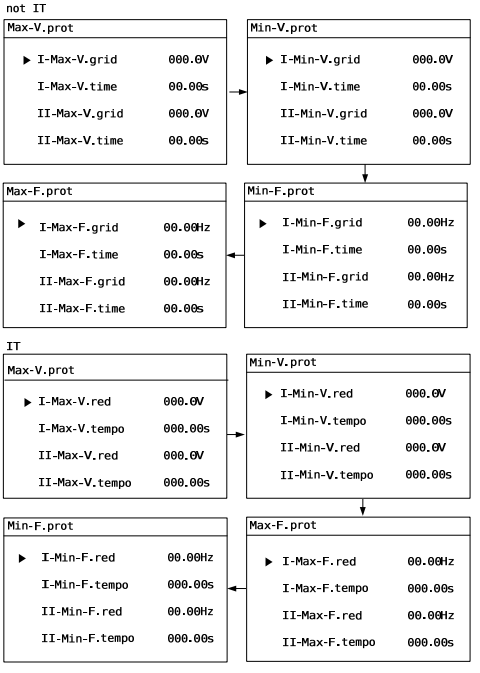
Step 7 If the country code set as other countries. You may choose Single-stage or Multi-stage. Press ▼ to select protective parameter type. Press **ENTER** to confirm the selection.



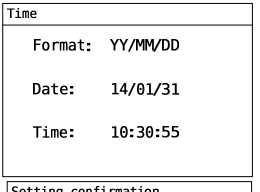
Step 8 If the selected protective parameter type is "Single-stage" or "[Ⅰ]", the following sub-menu will come up. **Press** ▼ to select parameter, **Press** ➤ to move cursor right and **Press** ▼ to set the appropriate value. Confirm settings by Pressing **ENTER**.



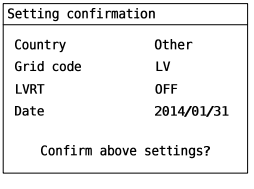
Step 9 If the selected protective parameter type is "Multi-stage" or "[Ⅱ]", the following sub-menus will come up. **Press** ▼ to select parameter, **Press** ➤ to move cursor right and **Press** ▼ to set the appropriate value. Confirm settings by Pressing **ENTER**.



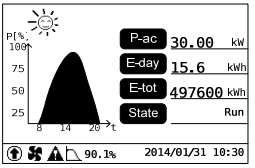
Step 10 Configure time according to the local time. Time setting is very important, which directly affects data logging. **Press** ➤ to move cursor and **Press** ▼ to scroll up time value. Confirm the settings by **Pressing ENTER**.



Step 11 After configuring all parameters, there will be a "Setting confirmation" screen. Check whether all above-mentioned parameters are correct. Confirm by **Pressing ENTER**. Cancel by **Pressing ESC** and reset.



Step 12 Inverter will enter into startup process. Observe status of LED indicators and the LCD main screen. If inverter's commissioning succeeds, the "RUN" indicator will be lit and "RUN" will be displayed on the "State" area.



If inverter's commissioning fails, the "FAULT" indicator will be lit and "fault" will occur on the display. Press ▼ to view "current fault" information. Remove the existing fault and then repeat starting up inverter as the above procedures.

6 Technical Data

6.1 Technical Data

Parameters	SG30KTL-M
Input Side Data	
Max. PV input power	30800W
Max. PV input voltage	1000V
Startup voltage	300V
Nominal input voltage	620V
MPP voltage range	280…950V
MPP voltage range for nominal power	480...800V
No. of MPPT(s)	2
Max. number of PV strings per MPPT	4
Max. PV input current(DC1/DC2)	66A(33A/33A)
Max. input current for input connector	12A
Short-circuit current of PV input (DC1/DC2)	80A(40A/40A)
Output Side Data	
Nominal AC output power	30000W
Max. AC output apparent power	33120VA
Max. AC output current	48A
Nominal AC voltage	3/N/PE, 230/400Vac
AC voltage range	310...480Vac (May vary as per corresponding country's grid standard.)
Nominal grid frequency	50Hz/60Hz
Grid frequency range	45...55Hz/55...65Hz (May vary as per corresponding country's grid standard.)
THD	< 3 % (at nominal power)
DC current injection	<0.5%In

Parameters	SG30KTL-M
Power factor	>0.99 default value at nominal power (adj. 0.8 overexcited...0.8 underexcited)
Protection	
Anti-islanding protection	Yes
LVRT	Yes
AC short circuit protection	Yes
Leakage current protection	Yes
DC switch	Integrated
DC fuse	Integrated
Overvoltage protection	Type II DC SPD
System data	
Max. efficiency	98.3%
Max. European efficiency	98.0%
Isolation method	Transformerless
Ingress protection rating	IP65
Night power consumption	<1W
Operating ambient temperature range	-25... + 60℃ (>45℃ derating)
Allowable relative humidity range	0...100%
Cooling method	Smart forced air cooling
Max. operating altitude	4000m (>3000m derating)
Display	Graphic LCD
Communication	RS485 (RJ45 connector)
DC connection type	MC4
AC connection type	Screw connection
Certification	VDE0126-1-1, EN62109-1, EN62109-2, G59/2, CEI-021, AS/NZS 3100, AS4777.2, AS4777.3, VDE-AR-N-4105, BDEW, CGC-SOLAR.
Mechanical Data	
Dimensions (W×H×D)	634×820×257mm
Mounting method	Wall bracket
Weight	65kg

SUNGROW

Green and Effective

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Specifications are subject to changes without advance notice.